March 16, 1954 R. GOLDNER 2,672,192

SHUTTER OR THE LIKE AND SLATS THEREFOR

Filed Dec. 6, 1951

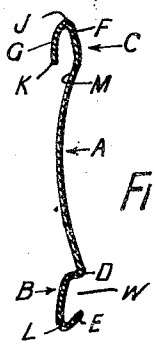


FIG. 1.

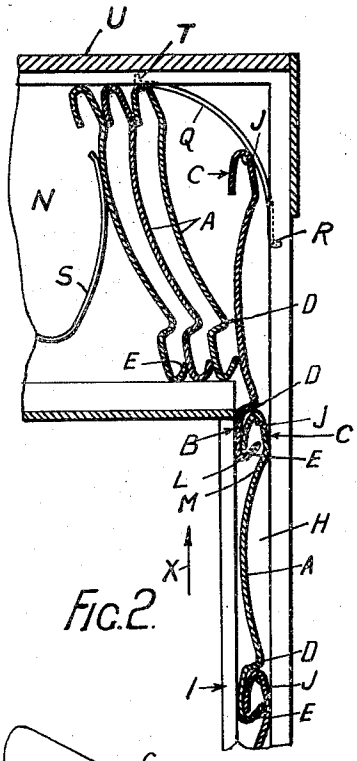


FIG. 2.

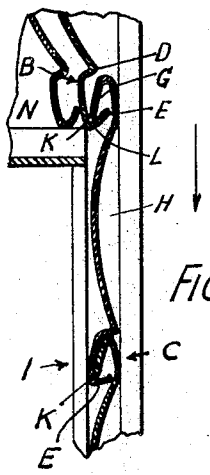


FIG. 3.

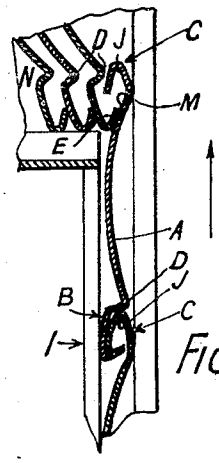


FIG. 4.

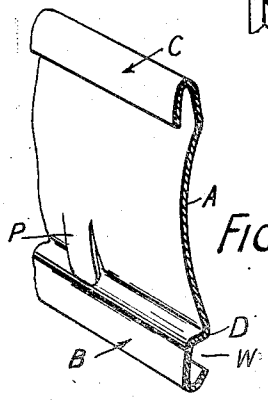


FIG. 5.

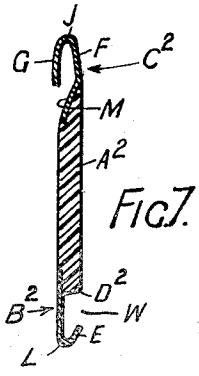


FIG. 7.

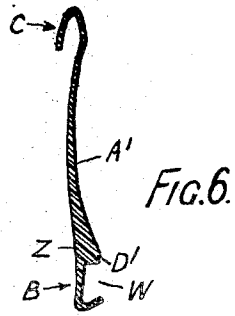


FIG. 6.

INVENTOR:
RICHARD GOLDNER
BY Leon M. Strauss
ATT.

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SHUTTER OR THE LIKE AND SLATS THEREFOR

Richard Goldner, Sydney, New South Wales, Australia

Application December 6, 1951, Serial No. 260,254

Claims priority, application Australia November 2, 1951

6 Claims. (Cl. 160—32)

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This invention has reference to shutters for the covering and uncovering of apertured structures, for instance wall apertures or of the open front, side and/or top faces of furniture to replace doors, conventional roller shutters and the like.

More particularly the present invention is applicable to fire- and burglar-proof doors of shops, workshops, garages, lift wells and also doors of vehicles such as railway carriages, aircraft, vessels and the like.

The principle of the shutter according to the present invention is based on that described in the specification of my previous application Serial No. 225,960 of May 12, 1951. However, as distinct therefrom, the improved shutter comprises preferably, though not exclusively, shutter elements or slats made of sheet material, for instance sheet metal, plastic sheet material and the like.

In my said previous specification I described a shutter comprising spaced parallel shutter guides, several separate shutter slats slidable within the space bounded by these guides, anchoring elements at the opposite edges of each slat which project therefrom to different sides in directions transverse to its general plane and which edgewise connect adjoining slats whilst in that space, a magazine for disconnected slats which adjoins one end of the shutter guides at an angle thereto, and a driving arrangement whereby slats inside the magazine space are urged towards said guides.

The design of each slat was described to be such that the slat was devoid of any surface element which would obstruct its connection with and its disconnection from the edge of the adjoining slat nearer to the magazine even if the latter were inclined to point with its other (remote) edge towards the magazine.

In the forms described in my said previous specification the slats were either of a profile resembling Z-shape or, alternatively, each slat was formed with a shoulder or bulge facing the adjoining anchoring element thereof and designed in such a manner that said shoulder would take the pressure of the adjoining slat more remote from the magazine during opening of the shutter, but would nevertheless not obstruct either connection of the slats or their disconnection during operation of the shutter. This effect was achieved in the said previously described forms on account of the fact that the anchoring element on the one hand, and the face of the slat or said shoulder or bulge on the other

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hand, define a space for the accommodation of the anchoring element of an adjoining slat which space widens continually in the direction away from the slat surface.

A further feature of my said previously described invention was that a more satisfactory operation could be achieved by the provision of means, such as for instance a deflector or deflectors, which during opening of the shutter would impart to the free edge of each slat entering the magazine an angular inclination towards the magazine space.

The present invention has for its object the provision of slats wherein the anchoring element facing said shoulder does not provide a continually widening space for the mating anchoring element of an adjoining slat, but a space which is constricted in the direction away from the slat face and which nevertheless is so designed as to permit safe engagement and disengagement of the mating elements in the vicinity of the magazine space and which at the same time affords considerable advantages as regards rigidity of the shutter and its burglar-proofing. More particularly the improved design is applicable to slats made of sheet material, for instance of sheet iron, sheet steel, aluminum or plastic sheets, but it is not necessarily limited to such slats as the web portion of the slats between the anchoring elements is capable of modification in various ways within the scope of this invention and can, for instance with slats of composite materials, be replaced by a section of different or varying thickness.

In order to more particularly describe the invention, reference is made to the accompanying drawing which, by way of example, illustrates some forms of the improved slat, and wherein:

Fig. 1 shows one specific form of the slat in cross section;

Fig. 2 shows in fragmentary cross-section the shutter guide and magazine of a cabinet with a number of slats of the kind illustrated in Fig. 1 in different conditions of engagement and stacking respectively;

Fig. 3 is a fragmentary sectional view similar to Fig. 2, illustrating a particular phase of the shutter operation during closing of the shutter;

Fig. 4 is a fragmentary sectional view similar to Fig. 2 illustrating another phase during the shutter operation, viz. during opening of the shutter;

Fig. 5 is a perspective view of a fragment of a modified form of shutter slat according to this invention; and

Figs. 6 and 7 illustrate in cross-section other possible modifications of slats according to this invention.

One specific form of the improved slat made of a strip of sheet metal or of some other sheet material (for instance synthetic material) by pressing, folding or by an extrusion process—as the case may be—or by a combination of working processes, is shown in Fig. 1. This slat comprises a web portion A which is curved in cross-section so as to be concave at one side and convex at the opposite side, and channel-shaped anchoring elements B and C which follow the opposite edges of the web portion A.

The channel-shaped element B which in the assembled shutter (Fig. 2) is more remote from the magazine, is about trapezoidal in cross-section and is provided with an aperture W extending along the concave side or face of the web A. Laterally it is bounded by a shoulder D which constitutes one edge of the web A, and by a lip E which is inclined towards the shoulder D by a small angle.

The channel-shaped anchoring element C, on the other hand, is about V-shaped or inverted V-shaped and opens towards the convex side of the web A. It is constituted by two slightly curved or band-shaped wall portions F and G, and it is designed and dimensioned to be capable of nesting within the space of the anchoring element B of an adjoining slat, between the shoulder D and lip E of that element B as is shown in Fig. 2 of the accompanying drawing.

Fig. 2 shows a number of shutter slats within the guides H of a shutter for a cabinet, only one of said guides being visible on the drawing. That figure also depicts a number of disengaged slats stacked in angularly inclined positions within a magazine N which adjoins the open ends of the guides H, deflecting means Q for the slats, and a driving spring S which resiliently urges towards the guides H the slats which at any time are stacked in the magazine N. In the illustrated example the deflecting means Q comprise each a leaf spring secured at R to the side of the guide H and at T to the ceiling U of the magazine N.

From Fig. 2 it will further be seen that each two slats anchored to one another within the guides H constitute at their joint a tubular structure I of multiple wall thickness which on account of the cross-sectional configuration of that joint possesses considerable rigidity, particularly in a direction transversely to the guides H. The tubular joint I safely prevents the forcing apart of adjoining slats whilst in the guides.

The apex J of each anchoring element C which, if so desired, may be rounded or blunted, engages the shoulder D during opening of the shutter in the direction of arrow X, as can be seen from Fig. 2. During closing of the shutter, on the other hand, the free edge K of the lip G of the element C engages the lip E at its bottom L and effects the transfer of the moving force on to the adjoining slat. As can be seen from Fig. 3, the edge K of the last slat in the guides H causes during closing of the shutter the gripping of the element B of the next slat in the magazine N as well as the erection of said slat during its entry into the guides H from its inclined position within the magazine.

During disengagement of the slats, on the other hand, the curved section M of the web A adjoining the element C causes an inward thrust upon the preceding slat and thereby considerably assists the transfer of that preceding slat into the magazine N.

It will further be seen from Figs. 3 and 4 that due to the inclination imparted to each slat while in the magazine N (Fig. 2) by the deflectors Q, the anchoring element C is not obstructed by the shoulder D or by any other portion of the adjoining element in the magazine during either engagement or disengagement.

If carefully designed, a shutter embodying slats as described and shown operates safely and will not cause faulty attachment or blockage under any conditions of use, say for instance by accidental catching of a slat within the recess formed between the shoulder D and the web A. However where desired this recess may be avoided.

For instance with slats made of sheet metal the web portion adjoining the shoulder D may be deformed by punching or otherwise forming therein one or more than one tongue or flap P, said tongue or tongues being arranged to bridge the recess behind the shoulder D, as shown in Fig. 5.

If, as shown in Fig. 6, the slats are made of synthetic or like resinous material, say by an extrusion process, the convex side of the web A' may be thickened at Z behind the shoulder D', thereby avoiding any recess behind that shoulder.

Fig. 7 illustrates another modified form of slat according to this invention, which is made of composite materials, the anchoring elements B^2 and C^2 consisting of metal strip bent as required, whilst the web A^2 is made of synthetic material.

Securing of the anchoring elements B^2 and C^2 to the web A^2 can be effected in any appropriate manner, depending on the materials used. In every other respect the anchoring elements are designed substantially as described with reference to Fig. 1, except that the shoulder D^2 is here constituted by a portion of the edge of the web A^2.

It will be understood that composite slats may be made of different materials as well and may for instance comprise a wooden web portion.

In all forms as herein described and as shown on the drawing the anchoring element C or C^2 of a slat comprises a thin-walled lip G which is straight or only slightly curved, and which is of such a width that if by said element the slat engages an adjoining shutter slat, the lip G fits snugly within the space of the anchoring element B or B^2 of that adjoining slat. Consequently, the apex line J of the element C or C^2 effectively engages the shoulder D of that second slat and during opening of the shutter transfers the opening pressure uniformly on to said second slat.

During closing of the shutter, on the other hand, the edge K of the lip G effectively engages the bottom line L of the element B or B^2 of an adjoining slat within the guides and thus transfers the closing pressure or pull uniformly on to said second slat.

Engagement of each slat as it enters the guides H, with an adjoining slat in the magazine N, and its disengagement therefrom during opening of the shutter, take place while the slat in the magazine is in angularly inclined position with respect to the first-mentioned slat. As the lip G is thin-walled and straight or only slightly curved, its entry into the space of a co-operating element B or B^2 during closing of the shutter, or its withdrawal therefrom during opening is not obstructed notwithstanding the fact that the lip E of the latter element is somewhat inclined towards the shoulder D and the aperture W of the anchoring element B or B^2 is therefore slightly restricted.

Angular adjustment of the lip G within the space of an engaged element B or B^2 during opening or closing of the shutter, to permit disengagement and engagement, respectively, of slats during their transfer between the guides H and the magazine N, is not obstructed either due to the substantially linear contact, if any, of the apex line J with the shoulder D of the adjoining slat, the bottom L of the element B or B^2 forming a pivot line for the lip G during said angular adjustment.

During the gripping of each anchoring element B or B^2 of a slat in the magazine N as it presents itself to the lip G of an adjoining slat within the guides H, during closing of the shutter, engagement of the lip G with the bottom line L of the next slat removes any slight angular divergence between the slats concerned—if such divergence should occur at all. During opening of the shutter, on the other hand, the apex line J and the shoulder D as well as the lip E and the web section M secure the maintenance of proper alignment. The danger of edging of the slats during operation of the shutter is therefore minimised and practically eliminated.

While in engagement within the guides H, the lip G of an element C or C^2 and the bottom face of the co-operating element B or B^2 of an adjoining slat are in close contact. Similarly the lip E of the element B or B^2 closely faces the wall portion F of the anchoring element C or C^2. Therefore the elements B and C (or B^2 and C^2) form within the guides H a quasi-tubular structure I which due to the angular relationship between the lip E and the shoulder D is interlocked in a direction transversely to said guides and which at the same time strongly resists compression within the guides. Hence a shutter comprising metal slats according to the present invention can be rightly described as burglar-proof.

I desire it to be understood that I do not wish protection by Letters Patent to be limited to the forms of slats and of a shutter as herein described and as depicted in the drawing, as these are capable of further modification within the scope of this invention.

As in the specification of my application Serial No. 225,960, the term "shutter" here also is meant to embrace appliances different from those enumerated at the beginning of this specification, such as for instance removable awnings or sun roofs which, although not strictly "apertured structures," may yet be operated like shutters.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A slat for use in shutters of the separable slat type, comprising a web provided with a curved side face, anchoring elements each disposed at an edge of said web, one said anchoring element being channel-shaped of substantially V-shaped cross-section with the apex thereof uppermost and terminating in a lip having a free edge spaced from and directed substantially towards said curved side face of said web, the other anchoring element being channel-shaped of substantially trapezoidal cross-section and being bounded by a shoulder receding from and provided at the adjacent edge of said web, a bottom wall portion and a lip which is angularly inclined towards and spaced from said shoulder, the lip of the substantially V-shaped anchoring element of the slat being of a thickness corresponding to the width of the bottom wall portion of the substantially trapezoidal anchoring element to assure snug fit of said lip of said one element within the substantially trapezoidal anchoring element of the next adjacent slat for the same shutter while said apex of said one element is disposed below said shoulder of said adjacent slat.

2. A slat for use in shutters of the separable slat type, comprising a web having at opposite edges anchoring elements which follow said opposite edges of said web, one said anchoring element being channel-shaped of substantially V-shaped cross-section with the apex thereof outermost, said one anchoring element including a lip which diverges from said apex substantially towards one side of said web, said other element being channel-shaped of substantially trapezoidal cross-section and including a shoulder receding toward said one side of said web, a bottom wall portion and a lip extending from the latter portion and angularly inclined towards but spaced from said shoulder to form an aperture, the lip of the substantially V-shaped anchoring element of the slat being of a thickness less than the width of said aperture of said substantially trapezoidal anchoring element, and of a thickness corresponding to the width of the bottom wall portion of the substantially trapezoidal anchoring element to assure snug fit of said lip of said V-shaped anchoring element within the substantially trapezoidal anchoring element of another slat for the same shutter as well as easy engagement with and disengagement from such other slat.

3. A slat as claimed in claim 1, wherein said one side of the web which faces said substantially V-shaped anchoring element is at least partly curved.

4. A slat according to claim 2, wherein said web is reinforced behind said shoulder to provide a smooth surface of said web.

5. A shutter structure comprising a plurality of shutter slats, guides for said shutter slats, a magazine for said shutter slats, each of said shutter slats comprising a web, anchoring elements at opposite edges of said web, one of said anchoring elements being channel-shaped and substantially V-shaped in cross-section and including a band-shaped wall portion and a lip which diverges from said band-shaped wall portion and is directed substantially towards one side of said web, the other anchoring element being channel-shaped and substantially trapezoidal in cross-section and including a shoulder at the adjacent edge of said web, a bottom wall portion and a lip which is angularly inclined towards said shoulder, the lip of said one anchoring element of said slat being of a thickness corresponding to the width of said bottom wall portion of said substantially trapezoidal anchoring element to assure snug fit of the lip of said one anchoring element within the other anchoring element of another slat, a driving arrangement for said slats within said magazine, and means for deflecting said slats during transit between said guides and said magazine.

6. A shutter structure comprising a plurality of shutter slats, guides for said shutter slats, a magazine for said shutter slats, each of said shutter slats comprising a web, anchoring elements each at an edge of said web, respectively, one of said anchoring elements being channel-shaped and substantially V-shaped in cross-section and including a curved wall portion and a

lip which diverges from said curved wall portion and is directed substantially towards one side of said web, the other anchoring element being channel-shaped and substantially trapezoidal in cross-section and is bounded by a shoulder, a bottom wall portion and a lip which is angularly inclined towards and spaced from said shoulder, to thereby provide an aperture, the lip of said substantially V-shaped anchoring element of said slat being of a thickness less than the width of said aperture of said substantially trapezoidal anchoring element and of a width corresponding to that of the bottom wall portion of said substantially trapezoidal anchoring element to assure snug fit of said lip of said substantially V-shaped anchoring element within the substantially trapezoidal anchoring element of another slat as well as easy engagement with and

disengagement from such other slat, driving means for said slats within said magazine, and means for deflecting said slats during transit between said guides and said magazine.

RICHARD GOLDNER.

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